Standardization as a Critical Activity for Digital Twins of the Earth

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IEEE SA STANDARDS ASSOCIATION

Why Standards in Digital Twins of the Earth?

Standards can support effective development, integration and utilization of Earth's Digital Twins.

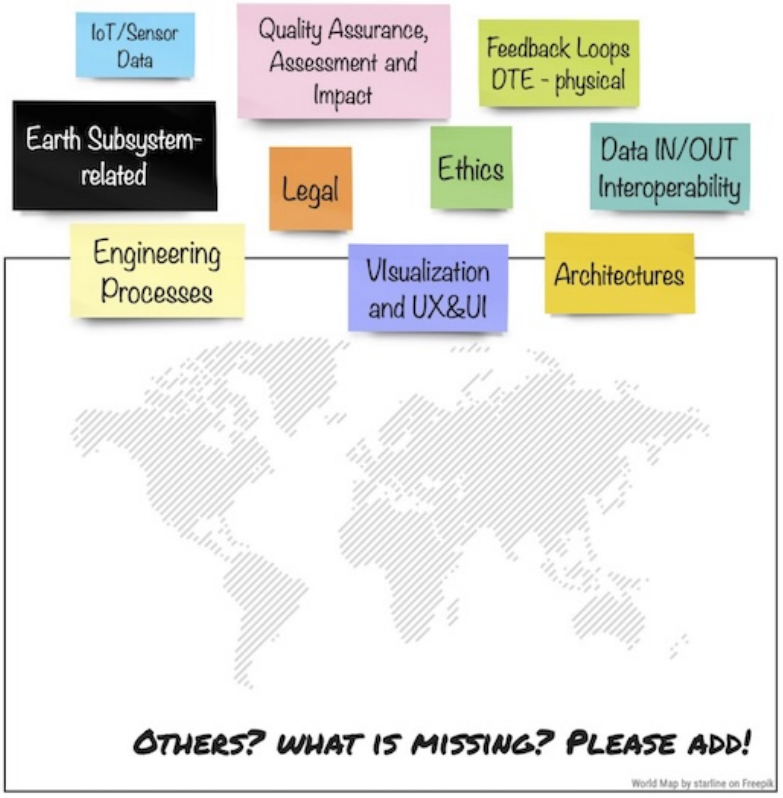
Standards for Earth's Digital Twins can enable Digital Twin actors to collaborate more effectively, reduce redundancy and minimize integration cost. As such, they play an important role in enhancing the utility of Digital Twins of the Earth (DTEs) for wider range of users, resulting in more informed decision making.

Using and developing standards in DTEs can bring a variety of beneifts, for example:

- Interoperability
- Comparability
- Seamless connections
- Common, exchangeable data formats
- Model adaptability to new (HPC) technologies
- Transparency
- Reproducibility
- Harmonization (e.g. between teams developing DTEs)
- Increased scalability (more variables, higher resolutions, etc.)

Standards used by all actors in the DTE chain, from development to operation to users, to create an ecosystem with higher consistency, accuracy, reliability and trust from stakeholders.

Potential Areas for DTE Standards



Activities in Digital Twins of the Earth Standardization at IEEE SA

(select examples)

Recommended Practice for the Development of Digital Twins of the Earth (P3501, hosted by IEEE Oceanic Engineering Society Standards Committee)

The purpose of this recommended practice is to aid in the creation of a digital twin and covers the development processes for Digital Twins of the Earth (DTEs) and their subsystems.

Good engineering practices are needed to support the development of interoperable digital twins - both on a technological level, but also to facilitate an exchange between the projects and engineers themselves, by fostering common vocabulary and understanding of basic DT components.

The project aims to establish consensus alignment on such development practices that help guide and validate the various layers of interoperability, including architecture, syntactics, schematics, semantics, and legal interoperability concerns.It is convening a multi-party group of (digital) engineers to propose engineering solutions that can let twins plug in to one another, and as such have a life beyond a single project.

The working group draws from a wide variety of contributors from organizations, companies and research projects worldwide.

Scan QR code or get in touch at sigmund@kluckner.eu to learn more and participate!

IEEE Oceanic Engineering Society

"Digital Twin of the Earth – Tools and Resources for Interoperable Development and Operations" - IEEE SA Industry Connections Group

Allowing a low-barrier entry to standards, this group convenes regularly to discuss possible future activities. The group aims to understand the landscape of DTE activities worldwide, also within other standards organizations. The group is currently working on developing a white paper on DTE standardization efforts and gaps.

The efforts on Standards for Digital Twins of the Earth are contributed by many actors, projects and organizations in the field.

The mentioned working groups originate from conversations and projects, most notably:

- EU projects: Iliad (Digital Twins of the Ocean), InterTwin, DT-GEO
- IMFe (implemented by NOC)
- NASA/ESTO/AIST ("Standards for Interoperable Digital Twins" workshop)
- DITTO - Digital Twin of the Ocean (DITTO summit satellite event on Standards and Best Practices for Digital Twins)

Iliad · interTwin · DT-GEO · National Oceanography Centre · NASA ESTO

Destination Earth · Funded by the European Union · Implemented by ECMWF · esa · EUMETSAT